

(4) rejected claims 1 and 2 under 35 USC 102(b) as being anticipated by Ashby et al.;

(5) rejected claims 1 and 2 under 35 USC 102(b) as being anticipated by Yoshida; and

(6) rejected claims 3-11 under 35 USC 103(a) as being unpatentable over Yoshida in view of Jewell.

In response to Item 1 above, Applicants acknowledge the previous election of Group I, claims 1-11, drawn to a VCSEL. Applicants expressly reserve the right to prosecute all non-elected subject matter in related applications.

In response to Item 2 above, Applicants have now amended claim 1 so as to more clearly define the present invention with respect to the prior art of record. Claim 1, as amended, comprises a VCSEL comprising an intracavity lens formed in the gain region.

Applicants believe that Jewell discloses a lens structure in an optical cavity in which the lens is configured separately from the gain region. At column 13, lines 63-65, Jewell states "spacer 164 separates gain region 144 from lens 166."

Accordingly, Applicants believe that Jewell teaches away from the present invention and that claim 1 is in condition for allowance. Allowance of claim 1 is respectfully requested.

Claims 2-11, which depend either directly or ultimately from claim 1, are believed to be in condition for allowance at least for the above-identified reasons. Accordingly, allowance of claims 2-11 is respectfully requested.

In response to Item 3 above, Applicants have now amended claim 1 so as to more clearly define the present invention with respect to the prior art of record. Claim 1, as amended, comprises a VCSEL comprising an intracavity lens formed in the gain region, and the intracavity lens extending across at least a central portion of the gain region.

Applicants believe that Fukuzawa et al. disclose a semiconductor device including an undoped superlattice layer 11, which serves as a laser active layer. Applicants believe that Fukuzawa et al. also disclose peripheral areas, identified as region 16, which are converted into a mixed crystal and are smaller in refractive index than the remaining superlattice layer (see column 6, line 33 to column 7, line 1). Applicants believe that Fukuzawa et al. does not disclose an intracavity lens extending across at least a central portion of the gain region. Accordingly, claim 1 is believed to be in condition for allowance, and allowance thereof is respectfully requested.

Claims 2-11, which depend either directly or ultimately from claim 1, are believed to be in condition for allowance at least for the above-identified reasons. Accordingly, allowance of claims 2-11 is respectfully requested.

In response to Item 4 above, Applicants have now amended claim 1 so as to more clearly define the present invention with respect to the prior art of record. Claim 1, as amended, comprises a VCSEL comprising an intracavity lens formed in the gain region.

Applicants believe that Ashby et al. disclose a laser diode structure with an upper cladding layer 40 having a multi-layered region 42 disordered with a dopant impurity so as to lower the effective refractive index. Applicants believe that this upper cladding layer 40 is separate from active layer 34 (see Fig. 3d and column 4, lines 57-68). Accordingly, claim 1 is believed to be in condition for allowance, and allowance thereof is respectfully requested.

Claims 2-11, which depend either directly or ultimately from claim 1, are believed to be in condition for allowance at least for the above-identified reasons. Accordingly, allowance of claims 2-11 is respectfully requested.

In response to Item 5 above, Applicants have now amended claim 1 so as to more clearly define the present invention with respect to the prior art of record. Claim 1, as amended, comprises a VCSEL comprising an intracavity lens formed in the gain region, and the intracavity lens extending across at least a central portion of the gain region.

Applicants believe that Yoshida discloses a semiconductor device with an active layer being laterally surrounded by an optical confinement region which has a refractive index smaller than the effective refractive index of the active layer. Applicants believe that Yoshida ~~does not disclose~~ an intracavity lens extending across at least a central portion of the gain region (see column 10, lines 48-53). Accordingly, claim 1 is believed to be in condition for allowance, and allowance there of is respectfully requested.

Claims 2-11, which depend either directly or ultimately from claim 1, are believed to be in condition for allowance at least for the above-identified reasons. Accordingly, allowance of claims 2-11 is respectfully requested.

In response to Item 6 above, Applicants have now amended claim 1 so as to more clearly define the present invention with respect to the prior art of record. Applicants believe that

neither Yoshida nor Jewel alone or in combination with one another disclose a VCSEL comprising an intracavity lens formed in the gain region, and the intracavity lens extending across at least a central portion of the gain region. Accordingly, claims 3-11, which depend either directly or ultimately from independent claim 1, are believed to be in condition for allowance at least for the above-identified reasons. Allowance of claims 3-11 is respectfully requested.

In the event that any additional fees may be required in this matter, please charge the same to Deposit Account No. 16-0221.

Respectfully submitted,

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